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(पहला पुनरीक्षण)

Indian Standard

LUBRICANTS FOR WIRE ROPES AND FIBRE CORES — SPECIFICATION

PART 3 LUBRICANTS FOR ROPE DRESSING IN SERVICE

(First Revision)

UDC 621·892·093 : 677·721

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Price Group 3

Lubricants and Related Products Sectional Committee, PCD 4

FOREWORD

This Indian Standard (Part 3) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Lubricants and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1979. This revision has been prepared as a result of review of the standard by Gear Transmission and Axle Oils Subcommittee, in the light of present day requirements and advancement in the field of lubrication technology in the country. In this revision apart from modifying the general requirements, the requirements for acidity and adhesion and stickiness have been deleted. In addition to this a new test for protection against corrosion at high temperature and high humidity has been added as per the requirements of the consumers of these types of lubricants.

This standard has been prepared with a view to facilitate the supply of a quality product to large and small scale consumers, most suited for their use under Indian climatic conditions.

This standard is intended chiefly to cover the technical provisions relating to the supply of the material and it does not include all the necessary provisions of a contract.

In the preparation of this standard considerable assistance has been derived from the International Standard ISO 3156 : 1976 'Stranded wire ropes for mine hoisting — impregnating compounds, lubricants and service dressings — characteristics and tests' issued by the International Organization for Standardization.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ' Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

LUBRICANTS FOR WIRE ROPES AND FIBRE CORES — SPECIFICATION

PART 3 LUBRICANTS FOR ROPE DRESSING IN SERVICE

(First Revision)

1 SCOPE

This standard (Part 3) prescribes the requirements and the methods of sampling and test for lubricants for rope dressing in service.

2 NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provision of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
170 : 1986	Specification for acetone (*third revision*)
513 : 1973	Specification for cold rolled carbon steel sheets (*second revision*)
517 : 1986	Specification for methanol (methyl alcohol) (*second revision*)
597 : 1978	Specification for pack rolled tin plate and pack rolled black plate (*second revision*)
1070 : 1992	Reagent grade water (*third revision*)
1205 : 1978	Determination of softening point
1447 : 1966	Methods of sampling of petroleum and its products
1448	Methods of test for petroleum and its products

3 TYPES

The lubricants for fibre core should be a petroleum based product of only bituminous type.

4 GRADES

The material shall be of the three grades depending on the viscosity to be designated as follows:

a) Grade 1,
b) Grade 2, and
c) Grade 3.

5 REQUIREMENTS

5.1 General Requirements

Lubricants used for rope dressing services should have the properties given in **5.1.1** to **5.1.11**.

5.1.1 The material shall be homogeneous and shall, if heating is required for application, return to substantially the same state after heating, that is, the material shall be heat reversible.

5.1.2 The material shall not have any grit, abrasive matter, water, chlorides or other visible impurities.

5.1.3 The material shall not contain any additive or compound which in combination with moisture in any of its forms, could form products inherently corrosive to steel or zinc or detrimental to the fibres comprising the rope or to the pulley lining.

5.1.4 The material shall be compatible with all other lubricants used in the rope.

5.1.5 The material shall be resistant to significant age embrittlement.

5.1.6 The material shall not contain any additive or compound which due to degradation by either heat or exposure to natural sunlight could form products inherently corrosive to steel or zinc or detrimental to the fibres comprising the rope or to the pulley lining.

5.1.7 The material shall not contain any injurious ingredient that is likely to harm the user.

5.1.8 The material shall be able to protect the fibre from microbiological degradation.

5.1.9 The material shall be of a soft consistency to keep the core pliable and permit oozing of lubricant at normal working temperature and pressure.

5.1.10 The material shall not be displaced or washed out by water and cause corrosion.

5.1.11 The material shall be capable of penetrating into the wire ropes during application.

5.2 Detailed Requirements

The material shall also comply with the requirements prescribed in Table 1 when tested according to the methods given in 'P' series of IS 1448 and Annexes to this standard. Reference to the relevant methods of test is given in col 6 of the table.

5.3 Special Requirements for Koepe Winding Ropes

When the lubricants are used for koepe winding ropes it should meet the following additional requirements under normal operating conditions.

5.3.1 The lubricant used for surface dressing on koepe winding ropes shall have the coefficient of friction between the rope and koepe lining values as agreed between the purchaser and the supplier.

6 PACKING AND MARKING

6.1 Packing

The material shall be supplied in suitable containers as agreed to between the purchaser and the supplier.

6.2 Marking

Each container shall be marked with the following information:

a) Name, grade and type of the material;
b) Indication of the source of manufacture, initials or trade mark, if any;
c) Quantity of the contents; and
d) Year of manufacture.

6.2.1 Each container may also be marked with the Standard Mark.

7 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 1447 : 1966.

8 KEEPING PROPERTIES

The material when stored in original sealed containers under normal temperature conditions under shade shall retain the properties described under **5** for a period of not less than one year from the date of manufacture.

Table 1 Requirements for Lubricants for Rope Dressing in Service

(*Clause* 5.2)

Sl No.	Characteristic	Requirement for			Methods of Test, Ref to [P :] of IS 1448 and Annexes
		Grade 1	Grade 2	Grade 3	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Kinematic viscosity at 100°C, cSt, *Min*	80 to 130	250 to 350	450 to 650	P : 25
ii)	Total alkalinity, as $Ca(OH)_2$, percent by mass, *Max*	0·5	0·5	0·5	P : 53
iii)	Acidity:				
	a) Inorganic	Nil	Nil	Nil	P : 2
	b) [1]Organic (mg KOH/g), *Max*	1·0	1·0	1·0	
iv)	Drop point, °C, *Min*	60 to 80	60 to 80	60 to 80	P : 52
v)	Water content, percent by mass, *Max*	0·25	0·25	0·25	P : 40
vi)	Water repellancy and anti-corrosive properties	←——Shall pass the test——→			Annex A
vii)	Test for protection against corrosion at high temperature and high humidity	←——Shall pass the test——→			Annex B
viii)	Low temperature flexibility test	←——Shall pass the test——→			Annex C

[1] Organic acidity shall be determined before the addition of additives. The organic acidity of the finished product shall be as agreed between the purchaser and the supplier and be reported.

ANNEX A

[*Table* 1, *Sl No.* (vi)]

TEST FOR WATER REPELLANCY PROPERTY AND PROTECTION AGAINST CORROSION

A-1 APPARATUS

A-1.1 Glass Desiccator

The glass desiccator shall be provided with tight-fitting lid. Its dimensions shall be such that when the test panels are suspended, there is at least 38 mm gap between the test panels and any side of the desiccator as well as between the free surface of the liquid and the bottom of the panels.

A-2 MATERIALS

A-2.1 Mild Steel Panels

The mild steel test panels required for this test shall be of panel sheet (drawing type) specified in IS 513 : 1973. The panels shall be approximately 80 × 40 × 1·3 mm in size with a 6 mm diameter hole drilled centrally near one of the shorter edges. The panels shall be free from mill scale or oxides, pits, scratches and other surface imperfections.

A-2.2 Carborundum Powder — (No. 150).

A-2.3 Toluene — Sulphur free.

A-2.4 Acetone — (*See* IS 170 : 1986).

A-2.5 Sodium Carbonate Solution

Saturated, containing an excess of sodium carbonate.

A-3 PREPARATION OF TEST PANELS

Polish the panels on both sides by means of a pad of filter paper and carborundum powder and then degrease with toluene. Rinse the panels with acetone and then dry for a few minutes in warm dry air. During and after degreasing, care shall be taken not to handle the test surface with bare hands.

A-4 PROCEDURE

A-4.1 Carry out the test in quadruplicate.

A-4.2 Immerse one by one the cleaned and degreased panels in the molten sample of the lubricant maintained between 90°C and 95°C for two minutes, then withdraw the coated panels and allow to hang for half an hour at room temperature. Thereafter, immerse the coated panels in the sodium chloride solution [3 percent *w/v* solution of NaCl (A. R. Grade)] at room temperature for two minutes, withdraw the panels and allow the salt solution to be drawn off for half an hour at room temperature.

A-4.3 After this, suspend the panels vertically in a closed desiccator containing sodium carbonate solution to maintain the appropriate humidity. Space the panels so that they are 38 mm apart between themselves as also from the sides of the desiccator and liquid surface. Leave the panels in the desiccator for 72 hours at room temperature after which take out the panels and remove the lubricant coating by wiping with a cloth soaked in a petroleum hydrocarbon solvent and then examine the panels for corrosion.

A-4.4 The material shall be taken to have satisfied the requirement of the test, if the surfaces of the three panels out of four are found to be free from light-brown patches due to rust and corrosion. Any corrosion extending up to 6 mm from the edges shall be ignored.

ANNEX B

[*Table* 1, *Sl No.* (vii)]

TEST FOR PROTECTION AGAINST CORROSION AT HIGH TEMPERATURE AND HIGH HUMIDITY

B-1 APPARATUS

B-1.1 Humidity Cabinet

The exact dimensions and design of the cabinet are left to the user's discretion, provided that the following conditions are observed.

B-1.1.1 *Humidification*

The humidity shall be maintained by evaporating water from a reservoir provided at the bottom of the cabinet. Distilled water (*see* IS 1070 : 1992) shall be used for this purpose and it shall be free from contaminants.

B-1.1.2 *Heating*

The heating shall be done through the medium of water either by means of heaters placed immediately below the water reservoir or by a heater completely immersed in the water.

B-1.1.3 *Temperature Cycle*

The heater shall be controlled in such a way that the temperature of the cabinet cycles continuously from 42 to 48°C and back to 42°C in not less than 45 minutes and not more than 75 minutes. The time requred for heating and cooling shall be approximately equal.

B-1.1.4 *Air Circulation*

The air shall be circulated by means of a fan in such a way that the temperature in any part of the air space in the cabinet shall not differ from that in any other part by more than 0·5°C.

B-1.1.5 *Spacing of Test Panels*

The panels shall be placed at least 40 mm apart and not less than 40 mm from any side of the cabinet.

B-1.1.6 *Exposure of Panels*

The panels shall either be supported on non-metallic racks or be suspended by nichrome wire hooks/glass hooks.

B-2 MATERIALS

B-2.1 Mild Steel Panels

The mild steel panels required for this test shall be of steel sheets (drawing type) specified in IS 513 : 1973. The panels shall be approximately 150 × 100 × 1·3 mm and shall have a 6 mm hole, drilled centrally, near one of the shorter edges. The panels shall be free from mill scale or oxides, pits, scratches or surface imperfections.

B-2.2 Emery Cloth (No. 1)

B-2.3 Emery Cloth (No. 0)

B-2.4 Toluene — sulphur-free.

B-2.5 Methanol — (*See* IS 517 : 1986).

B-3 PREPARATION OF MILD STEEL PANELS

Abrade the panels first with emery cloth No. 1 and then with emery cloth No. 0, finishing with circular motion until the surface is covered with circular burnishing marks superimposed on each other. Clean and degrease by swabbing with cloth soaked in toluene and then rinse the panels with methanol. Finally dry the panels in a current of warm, dry air and immediately coat with the material. During and after degreasing, do not handle the panels with bare hands.

B-4 APPLICATION AND DRAINING OF CORROSION PREVENTIVE

Immerse the panels completely in the corrosion preventive for a period of 2 minutes at 95 ± 1°C. Withdraw the panels and suspend vertically to drain at room temperature and at a relative humidity of 60 to 70 percent in a well ventilated room and out of direct sunlight for 24 hours.

B-5 PROCEDURE

B-5.1 The test shall be run in quadruplicate.

B-5.2 Maintain the coated panels vertically for a continuous period of 240 hours in the closed humidity cabinet, after which carefully remove the film of the material by swabbing with a cloth saturated with toluene and visually examine the exposed metals for corrosion.

B-5.2.1 The temporary corrosion preventive shall be taken to have satisfied the requirements of the test if three out of four panels do not show any sign of corrosion. Any corrosion extending up to 6 mm from the edges, suspension hole, and any corrosion due to local removal of the film by the supporting device shall be ignored.

ANNEX C

[*Table* 1, *Sl No.* (viii)]

TEST FOR LOW TEMPERATURE FLEXIBILITY

C-1 APPARATUS

A suitable apparatus for carrying out the test is shown in Fig. 1.

C-2 MATERIALS

C-2.1 Test Panels

The panel required for this test shall be made from 58 kg substance tin-plate (*see* IS 597 : 1978). The panel shall be approximately 75 × 25 mm in size. The panel shall have a 6 mm diameter hole drilled centrally near one of the shorter edges.

C-2.2 Toluene — Sulphur-free.

C-2.3 Methanol — (*See* IS 517 : 1986).

C-3 PREPARATION OF TEST PANEL

Thoroughly clean and degrease the panel by swabbing vigorously with pieces of clean cloth or filter paper soaked in toluene. Rinse the panel in methanol and then dry for a few minutes in a stream of dry air. During and after degreasing care shall be taken not to handle the test surface with bare hands.

C-4 PROCEDURE

C-4.1 Immerse the test panel in the material to be tested at 95 ± 1°C for two minutes. Suspend the panel from a glass hook and keep it in a vertical position for 24 h at room temperature and 60 to 70 percent relative humidity in a well ventilated place and out of direct sunlight. Remove the panel and subject it to a temperature of 0°C for one hour and while at this temperature, bend quickly through an angle of 180° over a 6·25 mm rod using an apparatus similar to that illustrated in Fig. 1 and previously cooled to 0°C.

C-4.1.1 The material shall be taken to have satisfied the requirement of the test, if the film does not rupture, flake or crack.

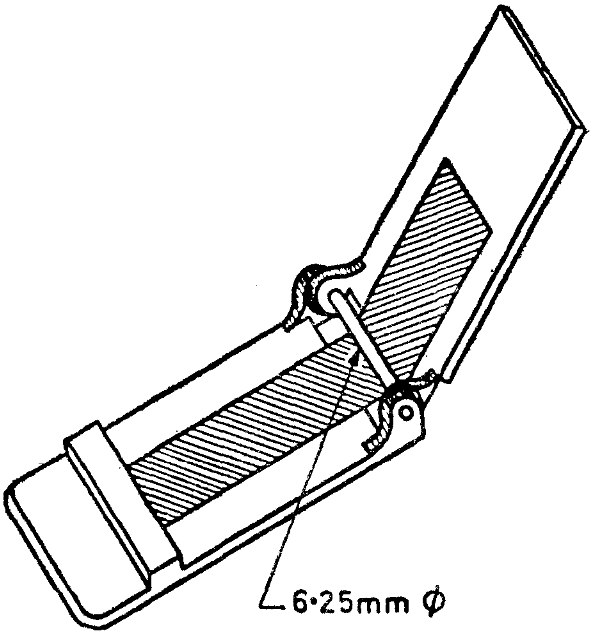

FIG. 1 APPARATUS FOR DETERMINING FLEXIBILITY

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